

Before The
Federal Trade Commission

CIGARETTES AND RELATED MATTERS

**Methods To Be Employed in Determining
Tar and Nicotine Content**

**AN ANALYSIS OF THE FEDERAL TRADE COMMISSION'S "REPORT OF TAR AND
NICOTINE CONTENT OF THE SMOKE OF 122 VARIETIES OF CIGARETTES"
OF OCTOBER 10, 1968**

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To the Honorable Commissioners:

Notwithstanding the absence of any evidence that "tar" and nicotine are related to a smoker's health, the undersigned have endeavored for more than two years to assist the Commission in the determination of a proper testing methodology and system of reporting results obtained in its own laboratory.

As a part of this continuing cooperation with the Commission, we filed on January 9, 1968, "*An Analysis of the Federal Trade Commission's 'Report of the Tar and Nicotine Content of the Smoke of 59 Varieties of Cigarettes' of November 20, 1967.*" In that *Analysis* the Commission's initial report of its test results of November 20, 1967, was evaluated, and recommendations were offered for essential modifications of the Commission's testing procedure based upon industry knowledge and experience.

The Commission has now released its third testing report entitled "*Report of Tar and Nicotine Content of the Smoke of 122 Varieties of Cigarettes, October 10, 1968.*" A careful analysis of this third Commission report conclusively demonstrates that the Commission's failure to follow recommendations repeat-

edly made by the undersigned has led to deficiencies which continue to make the Commission's results questionable.¹

The Commission decided to utilize precisely the same method of testing and reporting which it employed in its initial report of the "tar" and nicotine content of 59 varieties of cigarettes of November 20, 1967, and in its second report of the "tar" and nicotine content of 68 varieties of June 11, 1968. Accordingly, the scientific criticism offered in our analysis last January of the first Commission report applies with equal, indeed with demonstrably greater, force to this third report, and there is no need again to elaborate the basic points previously made.

What must, however, be emphasized is that the Commission's continued utilization of an inadequate sample size of 100 cigarettes per variety and a butt length of 23 mm. (or to the length of the filter and overwrap plus 3 mm. if in excess of 23 mm.) continues to produce test results *lacking the necessary precision* to permit, on any scientifically valid basis, the reporting of "tar" values to the nearest whole milligram, much less to a tenth of a milligram.

An elementary requirement for values to be reported to the nearest whole milligram, is that the error for none of the varieties reported may *exceed* 0.5 mg. In the Commission's first report of November, 1967, the error for the "tar" values of 35 of the 59 varieties—or approximately 59 percent of the varieties tested—*exceeded* 0.5 mg. In its second report of June, 1968, the "tar" and nicotine content of 68 varieties, 47 of the 68 varieties—or approximately 69 percent—had an error in excess of 0.5 mg.

The third report, released October 10, 1968, reveals that the "tar" content of 43 of the 122 varieties had an error in excess of 0.5 mg. In Tobacco Institute Testing Laboratory ("TITL") testing of these 122 varieties, which followed the Commission methodology and inadequate sample size, a comparable number of varieties had an error in excess of 0.5 mg.

Based upon these results the conclusion is now inescapable that even if laboratory personnel have achieved considerable experience, as both the Com-

¹ This Analysis is necessarily based upon the data afforded by the Commission's report alone. A more complete evaluation of that report could be made if all of the Commission's underlying data—and not merely the results contained in the report—were available. A more complete evaluation is in the public interest, and the Commission's underlying data has therefore been requested.

mission and TITL now have, the FTC methodology and sample size simply cannot produce the required precision.

The failure of the Commission laboratory to achieve the necessary precision in its third testing effort, by increasing the sample size per variety, and changing its choice of butt length, is even more difficult to understand in the light of the further data contained in the "*Additional Observations Following the 'Report of Tar and Nicotine Content of the Smoke of 59 Varieties of Cigarettes' of November 20, 1968,*" which we filed with the Commission on April 19, 1968. In those *Additional Observations*, the test results of TITL on the first cigarette pick-up, *utilizing our originally recommended sample size of 200 cigarettes and butt length of 30 mm.*, were reported to the Commission. These results empirically and cogently demonstrated the substantial increase in precision which could be attained by these recommended changes in the Commission's sample size and methodology.

The use of an inadequate sample size affects not only the precision of the results, but their accuracy or reproducibility as well. The average of the differences between the mean "tar" values reported by the Commission for the 122 varieties included in the third report and the mean "tar" values obtained by TITL in testing these 122 varieties in accordance with the Commission methodology was more than 0.6 mg. For 24 varieties the Commission and TITL results differed by at least 1.0 mg. This demonstrates that the Commission methodology is simply incapable of yielding reproducible results in two laboratories. It therefore hopelessly fails as a scientific method.

Moreover, the Commission's report of the "tar" and nicotine content of 122 varieties of cigarettes confirms and underscores once again the view of Chairman Dixon and Commissioner MacIntyre that the Commission should have adopted a 30 mm. butt length rather than the 23mm. butt length actually employed, with appropriate variations for filter cigarettes. Only 33 of the 122 varieties tested could be smoked to 23 mm. or to an average range of between 23 and 24 mm. The remaining 89 varieties were smoked to butt lengths of between 23 mm. and 36 mm. With the majority of the 122 varieties smoked to such a wide range of butt lengths, the rankings of the results reported for these 122 varieties are questionable.

In addition, for many individual varieties the 100 cigarettes actually tested were smoked to *widely differing* butt lengths. For example, the butt length of one variety of cigarettes was reported as 27-34 mm. Without access to the

Commission data it is impossible to determine how many of the 100 cigarettes were smoked to 27 mm., how many were smoked to 34 mm., and how many were smoked to butt lengths between 27 and 34 mm. It is also impossible to determine how the "tar" values obtained by smoking to each of these different lengths were "averaged" to yield the "tar" value reported by the Commission for that variety. It is clear, however, that the single "tar" value reported by the Commission for that variety did not accurately reflect the "tar" value obtained by smoking cigarettes of that variety to 27 mm. Nor did it accurately reflect the "tar" value obtained by smoking cigarettes of that variety to 34 mm. In this respect smoking one variety to widely differing butt lengths and reporting only a single "tar" value, as the Commission did in the case of many varieties, rendered the results for those varieties wholly inaccurate and meaningless to consumers. This deficiency could also have been minimized by the selection of a 30 mm. butt length.

The attendant confusion to the smoking public, due to the 23 mm. butt length, was compounded by the two tables of *rounded-off* "tar" and nicotine values arranged in ascending order for press publication, which failed to include the *range* of butt lengths to which each variety of cigarette was smoked. Smokers can certainly not evaluate or even understand the Commission's "tar" and nicotine results without these figures showing the varying butt lengths to which cigarettes were smoked. This problem would also have been materially alleviated by the selection of a 30 mm. butt length.

These tables of rounded-off "tar" and nicotine values—arrayed in ascending order—are misleading in other serious respects. Unless the *error* in "tar" values obtained by testing is 0.5 mg. or less, it is scientifically impossible and patently erroneous to round off to a *whole* milligram. Similarly, unless the testing error in nicotine is 0.05 mg. or less, it is scientifically impossible to round off to the nearest tenth of a milligram.

A simple example suffices to demonstrate the error in these rounded-off tables. In the case of one variety in the third report, the average was 19.0 mg. and the *error* was 1.1. This variety is shown in the rounded-off tables as 19 mg. of "tar". It is elementary statistics that the true average value for this variety lies between 17.9 and 20.1 mg., or if rounded off between 18 and 20 mg. *It is not possible to give rounded-off "tar" values to the nearest milligram unless the error is 0.5 mg. or less. The only correct way to deal with this situation is to state the "tar" value as a range.* (This point has previously been urged

to the Commission with full mathematical demonstration, in our Memorandum filed January 9, 1968, pp. 6-7.)

Erroneously reporting the "tar" value for a variety as 19 mg., which would more precisely be determined as 18 mg., means that the variety appears much lower on the chart than it would appear if more precise tests were conducted.

If the Commission wants to report scientifically acceptable values to the nearest whole milligram, it must modify its testing procedure, as we recommended, to attain the necessary precision.

What cannot be challenged is that the Commission's failure to list the measures of precision, or errors, in the rounded-off tables of "tar" and nicotine values for the 122 varieties, is scientifically indefensible. Merely because the Commission has rounded off values is no justification for omitting measures of precision. Scientific principles require that measures of precision be included with these experimentally determined values because the Commission's tests have only determined the range within which the true mean or average value is likely to fall. The middle of the range is of little value without the upper and lower limits, particularly where, as here, the lengths of the ranges vary and numerous ranges overlap.

Further, these tables of rounded-off values were obviously offered for public release with the resulting consumer utilization of the rounded-off numbers for comparative purposes. Experience has repeatedly confirmed that only the rounded-off tables will be available to consumers. These submerge all of the disclosed errors included in the detailed Commission tables. This is dramatically illustrated by the publication of *only* the list of rounded-off values of all 122 varieties by the *Washington Post* on October 16, 1968, page 3. What is presented to the consumer as a *table for comparative purposes* is a series of rounded-off numbers with no disclosure whatever of any errors.

In its third report, the Commission departed from the procedure employed in the June 11, 1968, report in which it had listed rounded-off values *alphabetically* and not in ascending order. It is unfortunate that the Commission did not follow this procedure in its third report, thereby at least somewhat minimizing the impact of the rounded-off values.

We respectfully urge the Commission to consider these scientific objections to the method of testing and reporting of results. For any future testing the

Commission should modify its sample size that is tested, its butt length, and its reporting in the manner originally recommended and now abundantly demonstrated to afford the minimum required precision.

Respectfully submitted,

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